Vacuum Diagrams

INTRODUCTION

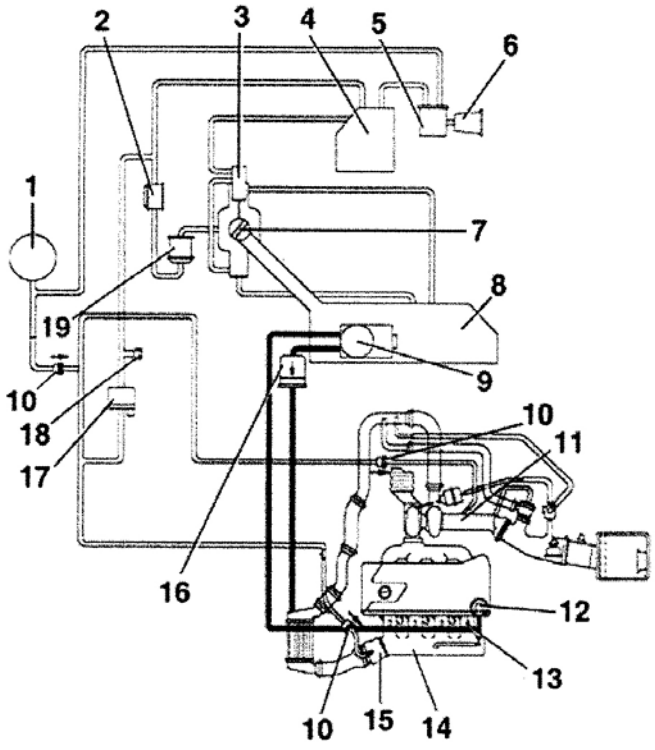
This article contains underhood views or schematics of vacuum hose routing. Vacuum diagrams are an excellent tool for identifying improperly routed vacuum hoses. Improperly routed vacuum hoses cause driveability and computer-indicated malfunctions.

NOTE: Always refer to Emission Control label in engine compartment before attempting service. If manual and label differ, always use emission label vacuum hose routing.

NOTE: Starting with model year 2000 some Secondary Air Injection Systems do not use vacuum for actuation of system components.

BEETLE, GOLF, GTI & JETTA

Gasoline



1- Vacuum Reservoir
2- Pressure Retaining Valve
- For Fuel Tank Breathing

3- Change-Over Valve
4- EVAP Canister
- In Right Rear Wheel Well Behind Wheel Housing Liner

5- Leak Detection Pump (LDP) (V144)
- At EVAP Canister

6- Air Cleaner For Leak Detection Pump
7- Tank Cap Unit
8- Fuel Tank
9- Fuel Delivery Unit
10- Check-Valve
- Installation Position: Arrow Points In Direction Of Flow

11- Intake Pipe Before Turbocharger
12- Fuel Pressure Regulator
13- Fuel Rail With Injectors
14- Intake Manifold Upper Part
15- Throttle Valve Control Module (J338)
16- Fuel Filter
- Installation Position: Arrow Points In Through-Flow Direction

17- EVAP Canister Purge Regulator Valve (N80)
- In Engine Compartment At Right Wheel Housing

18- Test Connection
19- Gravity/Overflow Valve

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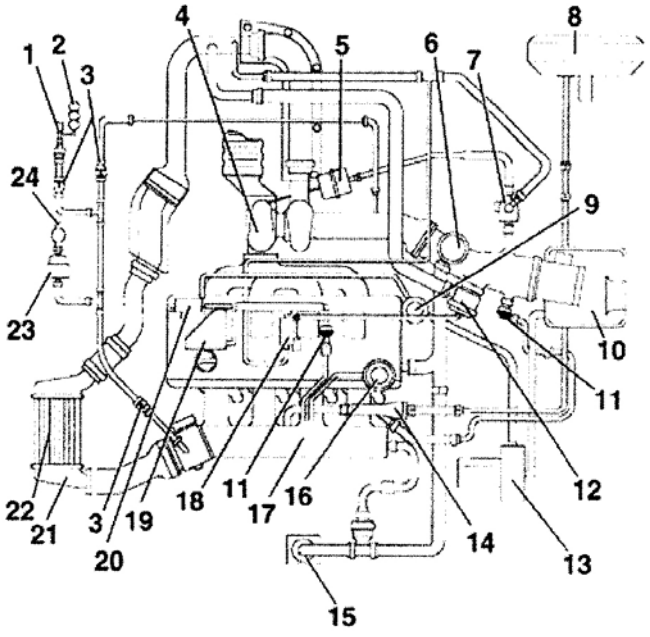
Fig. 1: Vacuum Diagram EVAP System (Beetle: 1.8L Turbo)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- **Connecting Pipe/Hose**
  • From Leak Detection Pump (LDP) (V144)
2- **Vacuum Reservoir**
  • Under Right Rear Wheel Well Liner
3- **Non-Return Valve**
  • Arrows Point In Direction Of Flow
4- **TurboCharger**
5- **Pressure Unit**
  • For Wastegate
6- **Crankcase Breather Pressure Regulating Valve**
7- **Wastegate Bypass Regulator Valve (N75)**
8- **Brake Servo**
9- **Combi-Valve**
10- **Air Cleaner With Mass Air Flow (MAF) Sensor (G70)**
11- **Non-Return Valve**
  • Arrow Points In Direction Of Flow
12- **Charge Pressure Bypass Valve**
13- **Secondary Air Injection Pump Motor (V101)**
14- **Vacuum Booster**
15- **Crankcase Breather**
16- **Fuel Pressure Regulator**
17- **Intake Pipe**
18- **Recirculating Valve For Turbocharger (N249)**
19- **Vacuum Reservoir**
20- **Secondary Air Injection (AIR) Solenoid Valve (N112)**
21- **Charge Air Pressure Sensor (G31)**
22- **Charge Air Cooler**
23- **Evaporative Emission (EVAP) Canister Purge Regulator Valve (N80)**
24- **Connecting Hose**
  • To EVAP Canister

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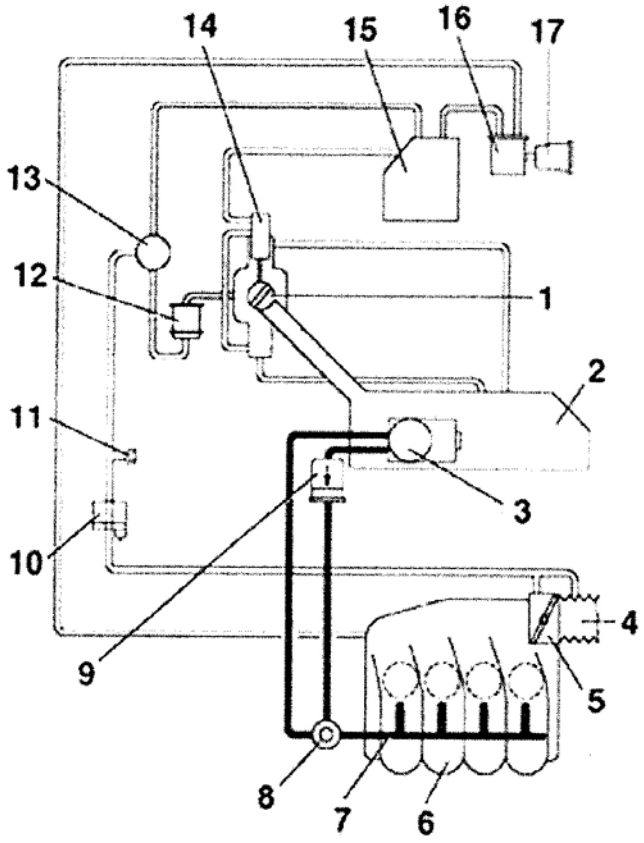
Fig. 2: Vacuum Diagram Secondary Air Injection & Turbo System (Beetle: 1.8L Turbo)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Tank Cap Unit
2- Fuel Tank
3- Fuel Delivery Unit
4- Intake Hose
5- Throttle Valve Control Module (J338)
6- Intake Manifold Upper Part
7- Fuel Rail With Injectors
8- Fuel Pressure Regulator
9- Fuel Filter
  • Installed Position : Arrow Points In Through-Flow Direction
10- Evaporative Emission (EVAP) Canister Purge Regulator Valve (N80)
11- Test Connection
12- Gravity/Overflow Valve
13- Pressure Retaining Valve
14- Change-Over Valve
15- EVAP Canister
  • In Right Rear Wheel Housing Under Wheel Housing Liner
16- Leak Detection Pump (LDP) (V144)
17- Air Cleaners For LDP

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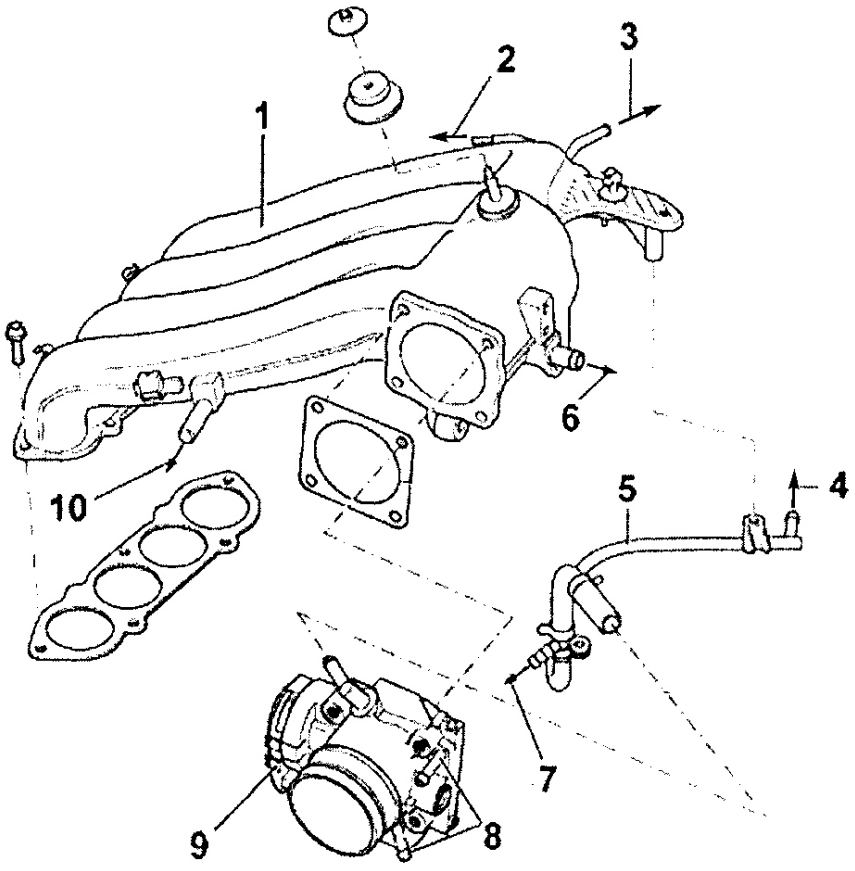
Fig. 3: Vacuum Diagram EVAP System (Beetle, Golf & Jetta: 2.0L, Engine Codes AVH, AZG & BDC) (GTI & Jetta: 1.8L Turbo)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Upper Intake Manifold
2- To Fuel Pressure Regulator
3- To The Leak Detection Pump (LDP) (V144)
4- To Rvaporative Emission (EVAP) Canister Purge Regulator Valve (N80)
5- Connection Tube
6- To Vacuum Line, Brake Booster
7- To Intake Hose
8- Connections For Coolant Hoses
9- Throttle Valve Control Unit (J338)
10- Connecting Piece
- As Of Model Year 2002 For Vehicles With Engine Code AVH, AZG
- To Molded Hose For Cylinder Head Cover Or Intake Hose

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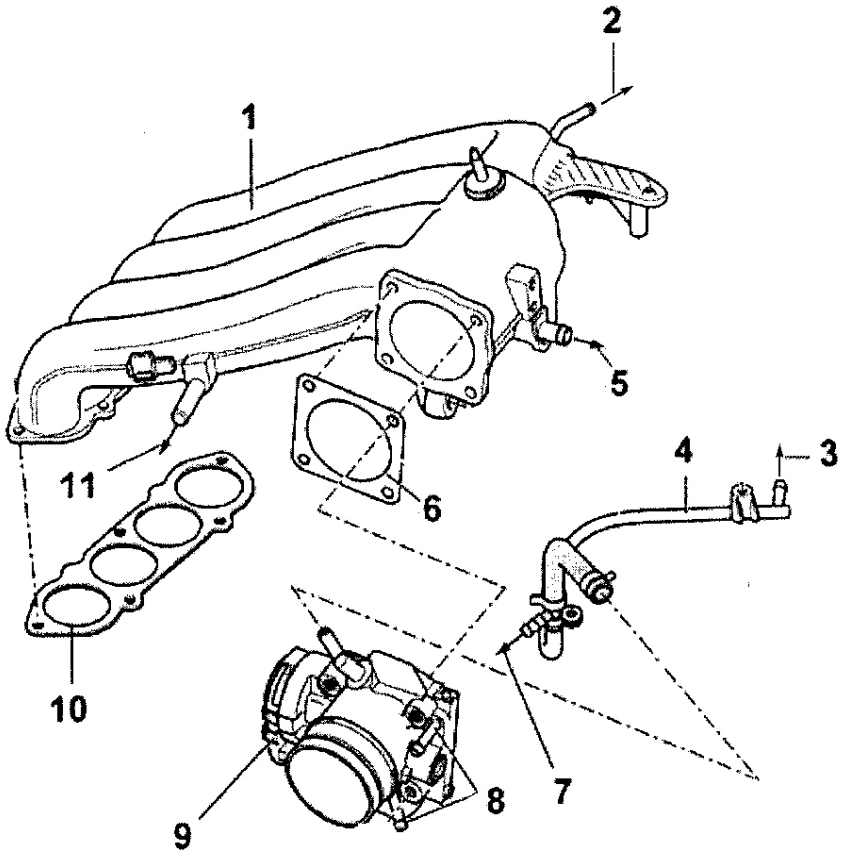
Fig. 4: Vacuum Diagram Intake Manifold, Upper Section (Beetle, Golf & Jetta: 2.0L, Engine Codes AVH & AZG)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Upper Intake Manifold
2- From Fuel System Leak Detection Pump (LDP) (V144)
3- From Evaporative Emissions Canister Purge Regulator Valve (N80)
4- Connecting Pipe
5- To Brake Servo Vacuum Line
6- Gasket
7- To Intake Hose
8- Coolant Hose
9- Throttle Valve Control Module (J338)
10- Gasket
11- Vacuum Connection
To Cylinder Head Cover Or Intake Specially Formed Hose

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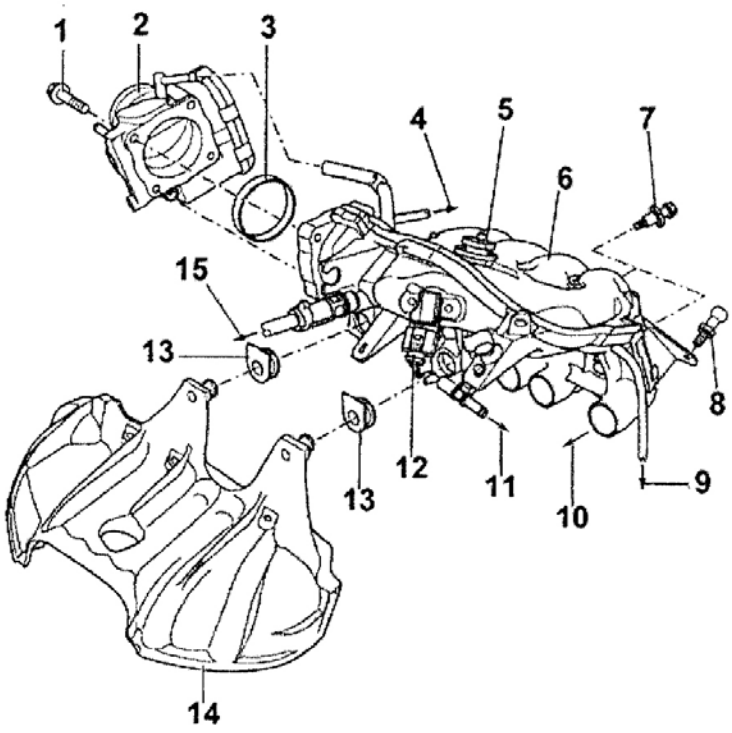
Fig. 5: Vacuum Diagram Intake Manifold, Upper Section (Beetle & Jetta: 2.0L, Engine Code BBW)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- 53 INCH Lbs.
2- Throttle Valve Control Module (J338)
3- Seal
Replace If Damaged
4- Vacuum Hose
To Intake Hose
5- Rubber Bushing
6- Upper Intake Manifold
7- 71 INCH Lbs.
8- 44 INCH Lbs.
9- Vacuum Hose
To Fuel Pressure Regulator
10- To Lower Intake Manifold
11- To Evaporative Emissions Canister Purge Regulator Valve (N80)
12- Manifold Absolute Pressure (MAP) Sensor (G71), With Intake Air Temperature (IAT) Sensor (G72)
13- Rubber Bushing
14- Warm Air Deflector Plate With Intake Manifold Support
15- To Brake Servo

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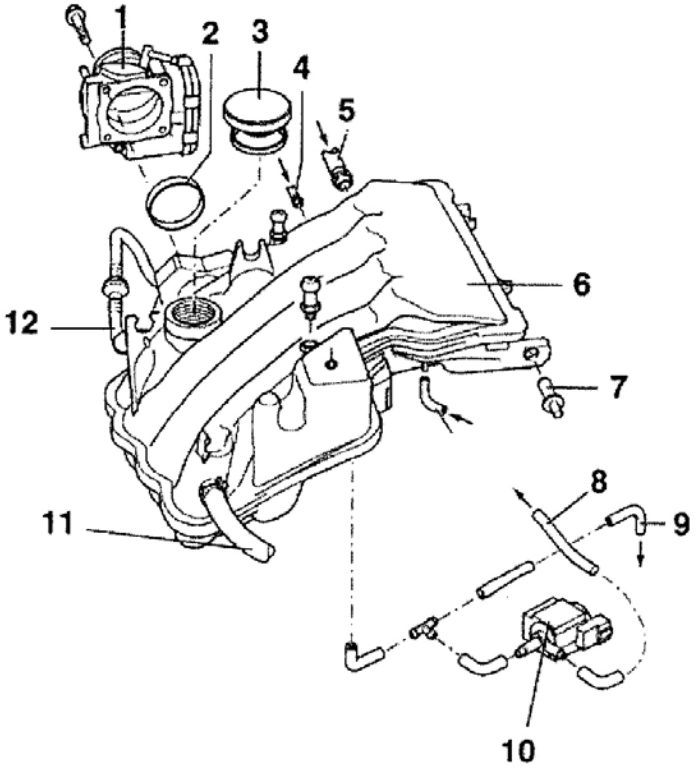
Fig. 6: Vacuum Diagram Intake Manifold, Upper Section (Beetle & Jetta: 2.0L, Engine Code BER)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Throttle Valve Control Unit (J338)
2- Seal
3- Pressure Relief Valve
- Protects Intake Manifold From Damage By Excessive Pressure

4- Vacuum Hose
- From PCV Heating Element (N79)

5- Molded Hose
- From Positive Crankcase Ventilation (PCV) Heating Element (N79)

6- Upper Intake Manifold
- With Intake Manifold Change-Over

7- Vacuum Hose
- From Fuel Pressure Regulator

8- To Vacuum Actuator
- On Underside Of Upper Intake Manifold

9- To T Fitting
10- Intake Manifold Change-Over Valve (N156)
11- To Leak Detection Pump (LDP) (V144)
12- To Brake Booster

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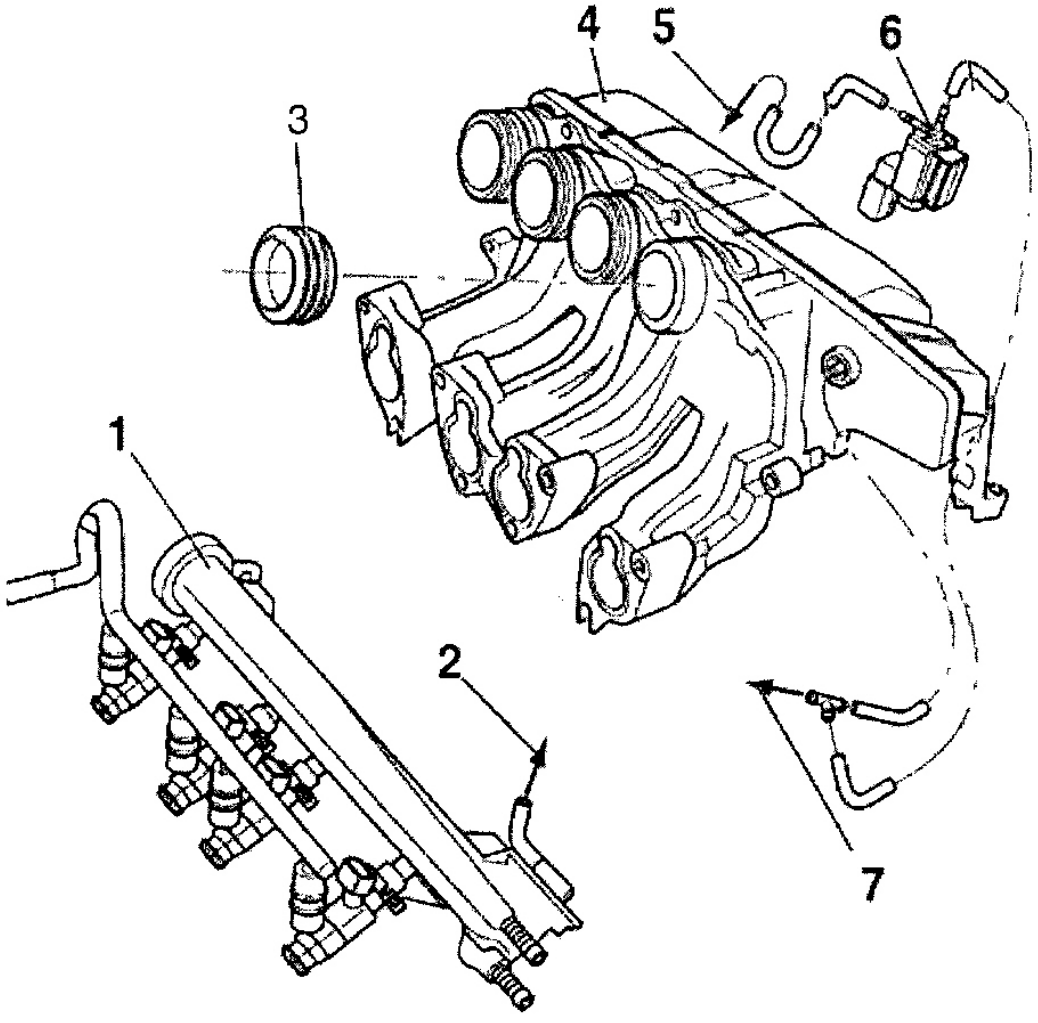
Fig. 7: Vacuum Diagram Intake Manifold, Upper Section (Beetle: 2.0L, Engine Code BDC)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



Lower Disassembly

1- Fuel Distributor With Fuel Injectors
2- Vacuum Hose
To Upper Intake Manifold
3- Seal
4- Lower Intake Manifold
With Intake Manifold Change-Over
5- To Vacuum Actuator
On Front Side Of Intake Manifold Lower Part
6- Intake Manifold Tuning (IMT) Valve (N261)
7- To Upper Intake Manifold

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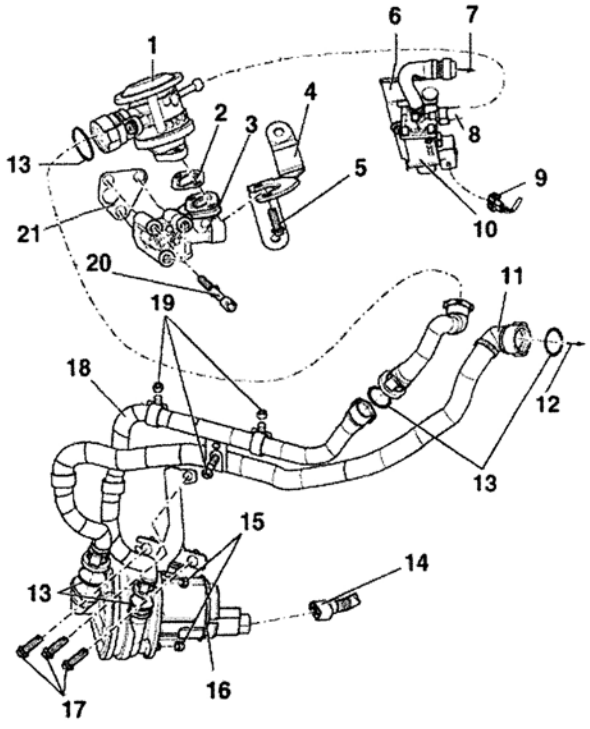
Fig. 8: Vacuum Diagram Intake Manifold, Lower Section (Beetle: 2.0L, Engine Code BDC)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Combi-Valve
2- Gasket
3- Connection
- Secured To Cylinder Head

4- Bracket
5- 89 INCH Lbs. (10 Nm)
6- Bracket
- Secure To Intake Manifold

7- To Vacuum Reservoir
8- Vacuum Hose
9- Connector
- 2-Pin

10- Secondary Air Injection (AIR) Solenoid Valve (N112)
- Resistance: 21 to 24 Ω

11- Intake Hose
- Make Sure Seated Tightly
- Press Together At Front To Release

12- To Air Cleaner
13- O-Ring
- Replace

14- Connector
- 2-Pin

15- 89 INCH Lbs. (10 Nm)
16- Secondary Air Injection (AIR) Pump Motor (V101)
17- 89 INCH Lbs. (10 Nm)
18-Pressure Hose
- Make Sure Seated Tightly
- Press Together At Front To Release

19- 89 INCH Lbs. (10 Nm)
20- 89 INCH Lbs. (10 Nm)
21- Gasket
- Replace

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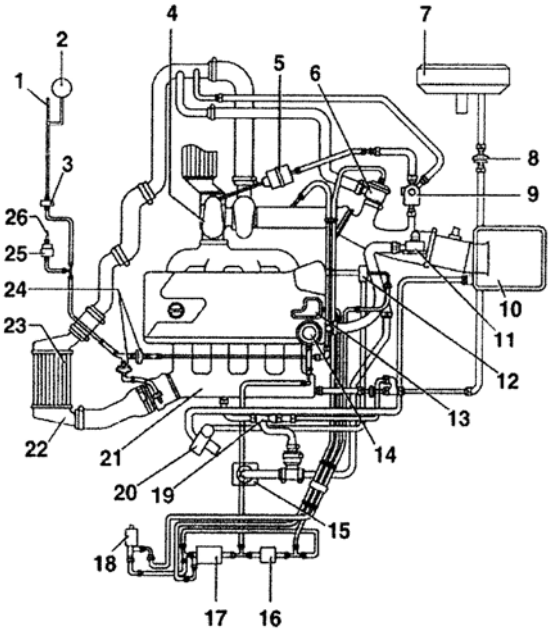
Fig. 9: Vacuum Diagram Secondary Air Injection System (GTI & Jetta: 1.8L)

Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Connecting Pipe/Hose
- From Leak Detection Pump (LDP) (V144)

2- Vacuum Reservoir
- Below Wheel Housing Liner At Front Right

3- Non-Return Valve
4- Turbocharger
5- Pressure Unit
- For Charge Air Pressure Control Valve (Wastegate)

6- Overrun Shut-Off Valve
7- Brake Servo
8- Non-Return Valve
- For Brake Servo

9- Wastegate Bypass + Regulator Valve (N75)
- The Valve Will be Activated From The Engine Control Module (Pulsed)

10- Air Cleaner With Mass Air Flow (MAF)
11- Cylinder Block Breather Pressure Regulating Valve
12- Combi-Valve
- For Secondary Air System

13- Vacuum Reservoir
14- Fuel Pressure Regulator
15- Cylinder Block Breather
16- Non-Return Valve
17- Recirculating Valve For Turbocharger (N249)
18- Secondary Air Injection (AIR) Solenoid Valve (N112)
19- Vacuum Booster
20- Secondary Air Injection (AIR) Pump Motor (V101)
21- Intake Pipe
22- Charge Air Pressure Sensor (G31)
23- Charge Air Cooler
24- Non-Return Valve
25- Evaporative Emission (EVAP) Canister Purge Regulator Valve (N80)
26- Connecting Hose
- To EVAP Canister

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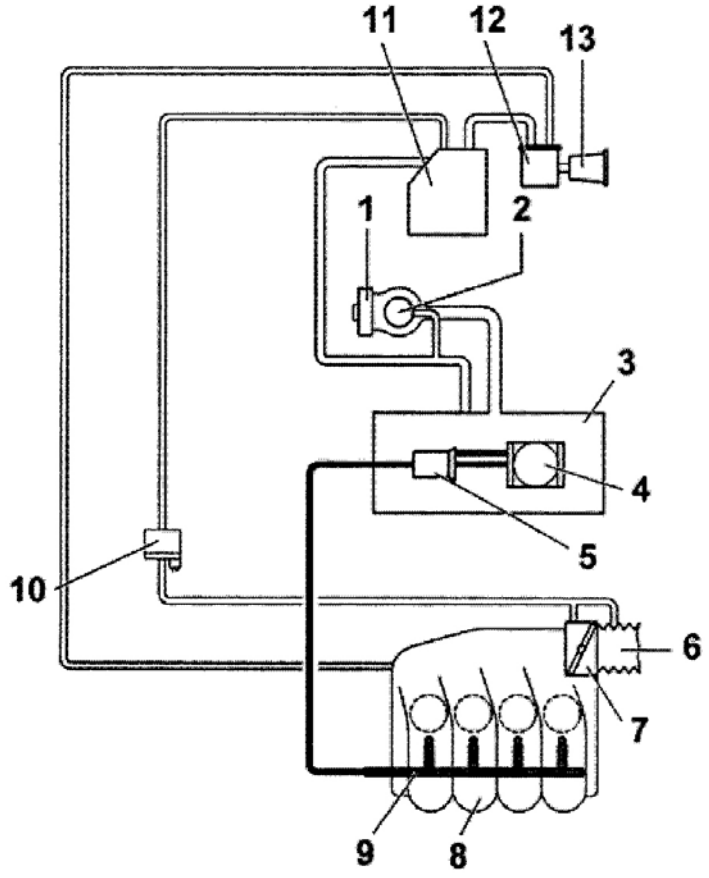
Fig. 10: Vacuum Diagram Turbo System (GTI & Jetta: 1.8L)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Tank Flap Unit
2- Non-return Valve
3- Fuel Tank
4- Fuel Delivery Unit
5- Fuel Filter
- Installed position: Arrow points in direction of flow

6- Intake Hose
7- Throttle Valve Control Module (J338)
8- Intake Manifold
9- Fuel Rail with Injectors
10- Evaporative Emissions (EVAP) Canister Purge Regulator Valve (N80)
- Front right in engine compartment
- Installed position: Arrow points in direction of flow

11- Evaporative Emissions (EVAP) Canister
- Behind right rear wheel housing liner

12- Leak Detection Pump (LDP) (V144)
- Behind right rear wheel housing liner

13- Air Filter for LDP (V144)

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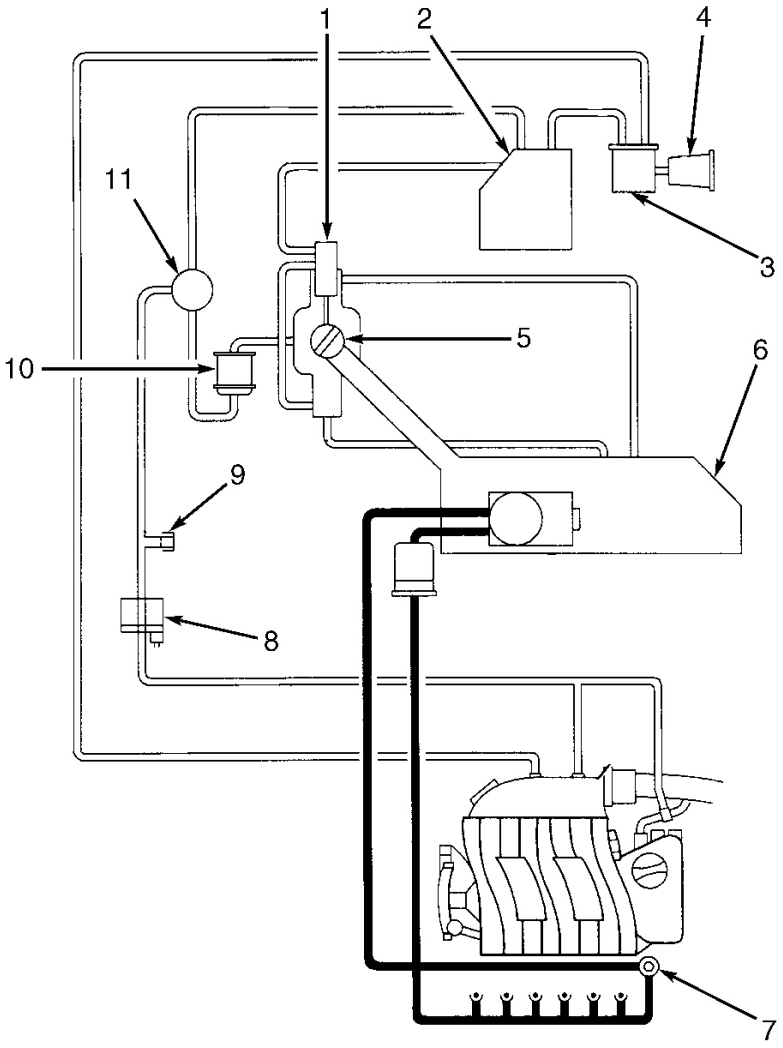
Fig. 11: Vacuum Diagram EVAP System (Golf & Jetta: 2.0L, Engine Code BBW)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1. Switch-Over Valve
2. EVAP Canister
3. Leak Detection Pump
4. Leak Detection Pump Air Filter
5. Fuel Filler Door Unit
6. Fuel Tank
7. Fuel Pressure Regulator
8. EVAP Canister Regulator Solenoid Valve
9. Test Port
10. Gravity/Overflow Valve
11. Pressure Retention Valve

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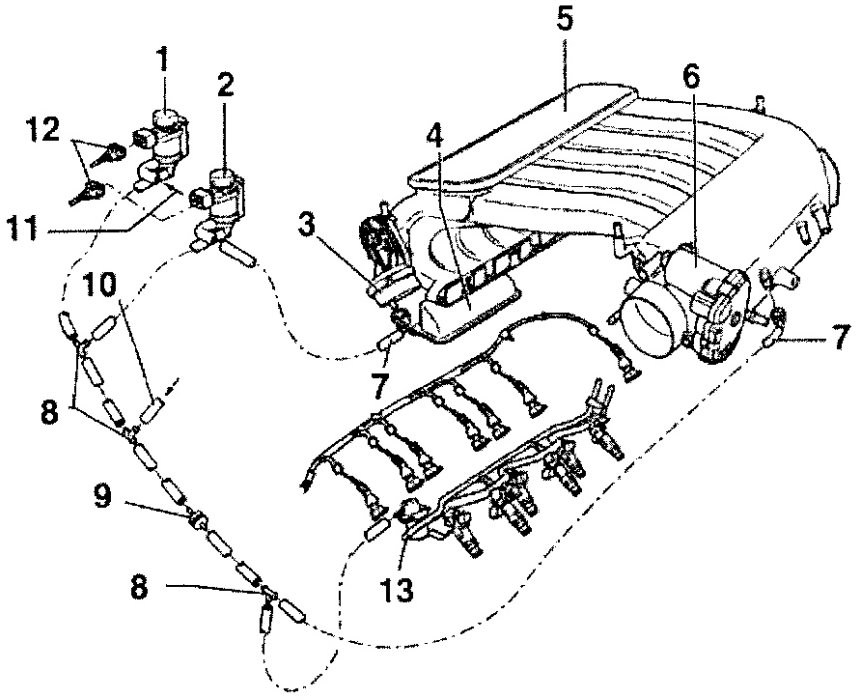
Fig. 12: Vacuum Diagram EVAP System (GTI & Jetta: 2.8L VR6 4V)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Secondary Air Injection (AIR) Solenoid Valve (N112)
2- Intake Manifold Change-Over Valve (N156)
3- Vacuum Actuator
- For Intake Manifold Change-Over (N156)

4- Vacuum Reservoir
5- Intake Manifold
6- Throttle Valve Control Module (J338)
7- Vacuum Line
- Press Together At Front To Release

8- Junction Piece
9- Non-Return Valve
- White Connector Faces Towards Secondary Air Injection (AIR) Solenoid Valve (N112) Intake Manifold Change-Over Valve (N156)

10- Vacuum Line
- From Vacuum Reservoir

11- From Combi-Valve, (Secondary Air System)
12- Connector
13- Fuel Rail

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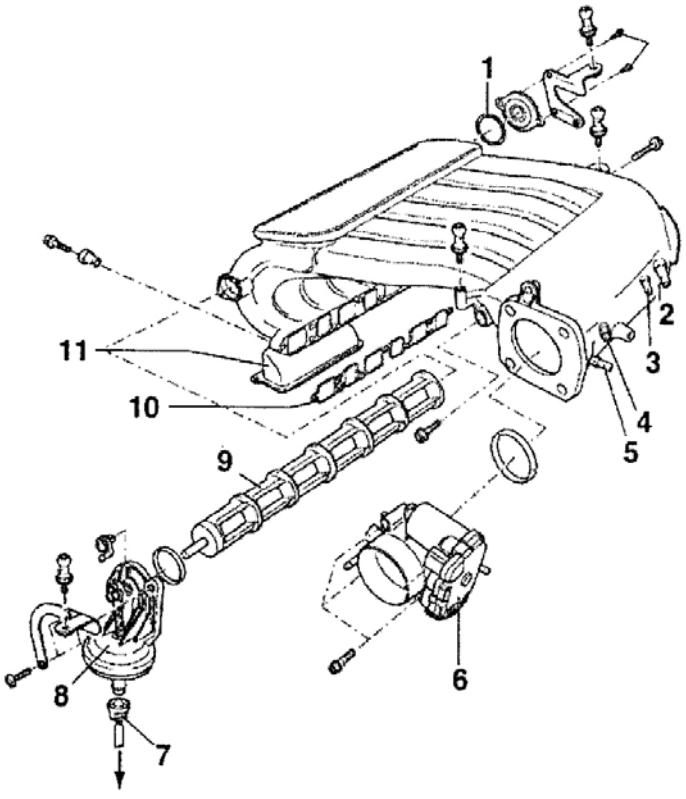
Fig. 13: Vacuum Diagram Intake Manifold, With Vacuum Solenoids (GTI & Jetta: 2.8L VR6 4V)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Intake Manifold
2- Vacuum Connection
- To Brake Booster

3- Vacuum
- To Fuel System Leak Detection Pump

4-Vacuum Connection
- To Fuel Pressure Regulator Junction Piece

5- Vacuum Connection
- To Cranckcase Breather/Evaporative Emission (EVAP)Canister Purge Regulator Valve

6- Throttle Valve Control Module (J338)
7- Vacuum Line
- To intake Manifold Change- Over Valve (N156)

8- Vacuum Actuator
- For Intake Manifold Change-Over Valve (N156)

9- Change-Over Barrel
10- Gasket
11- Vacuum Reservoir

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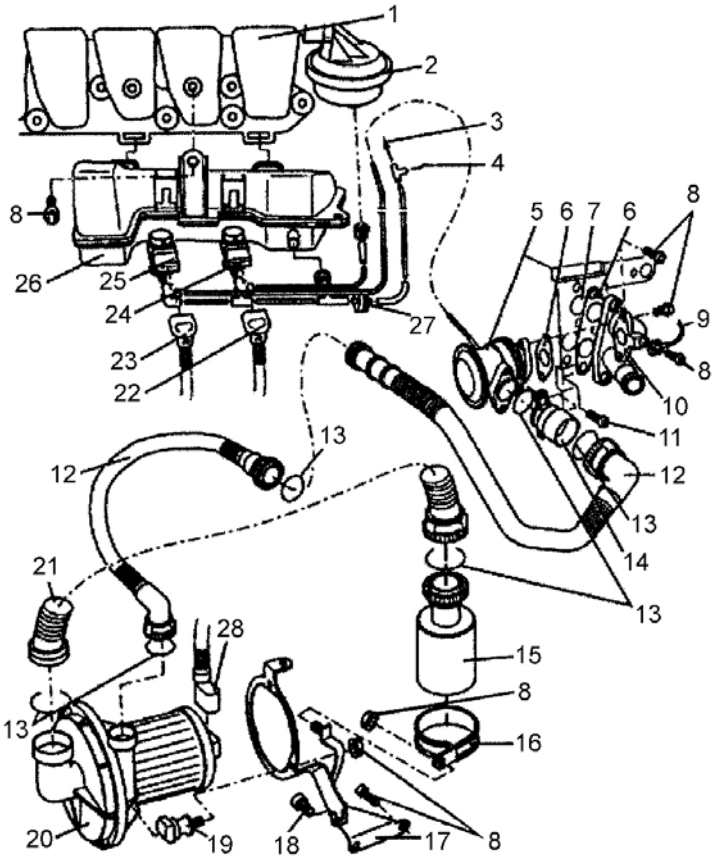
Fig. 14: Vacuum Diagram Intake Manifold (GTI & Jetta: 2.8L VR6 4V)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1 - Intake Manifold
2 - Vacuum Actuator
◆For Variable Intake Manifold Change-Over
3 - To Intake Manifold
4 - To Fuel Pressure Regulator
5 - Combi-Valve
6 - Gasket
7 - Air Channel
◆In Cylinder Head
8 - 71 INCH Lbs. (8 Nm)
9 - Ground Connection
10 - Unions
11 - 44 INCH Lbs. (5 Nm)
12 - Pressure Hose
◆Check If Securely Seated
◆Press Together At Front To Release
13 - O-Ring
◆Replace If Damaged
14 - Union
15 - Air Cleaner
◆Clean If Dirty
16 - Retaining Clip
17 - Bracket
18 - 15 Ft. Lbs. (20 Nm)
19 - Rubber Bushing
20 - Secondary Air Injection (AIR) Pump Motor (V101)
21 - Intake Hose
22 - Connector
23 - Connector
24 - Intake Manifold Change-Over Valve (N156)
25 - Secondary Air Injection (AIR) Solenoid Valve (N112)
26 - Vacuum Reservoir
27 - Non-Return Valve
◆Observe Installation Position
◆White Side Of Connector Faces Valves
28 - Connector

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Fig. 15: Vacuum Diagram Secondary Air Injection System (GTI & Jetta: 2.8L VR6 4V)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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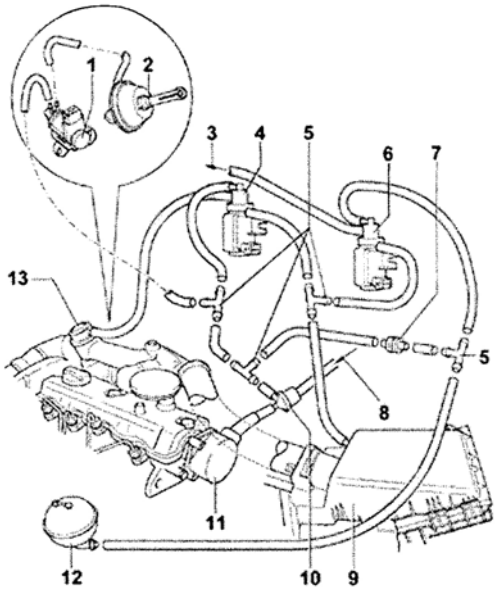

1 - Change-over Valve for Intake Manifold Flap (N239)

2 - Vacuum actuator

- Do not bend control rod

3 - Vacuum hose

- To vacuum unit for boost regulation on turbocharger

4 - EGR Vacuum Regulator Solenoid Valve (N18)

5 - T-connector

6 - Wastegate Bypass Regulator Valve (N75)

7 - Check valve

- Observe installation position: White connection points toward T-connector wastegate regulator valve and vacuum reservoir.

8 - From brake booster

9 - Air cleaner

10 - Check valve

- Observe installation position

11 - Vacuum pump

- For brake booster

12 - Vacuum reservoir

- Mounted with bracket to oil pan

13 - EGR Valve

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Fig. 16: Vacuum Diagram EGR & Turbo System (Beetle, Golf & Jetta: 1.9L Turbo)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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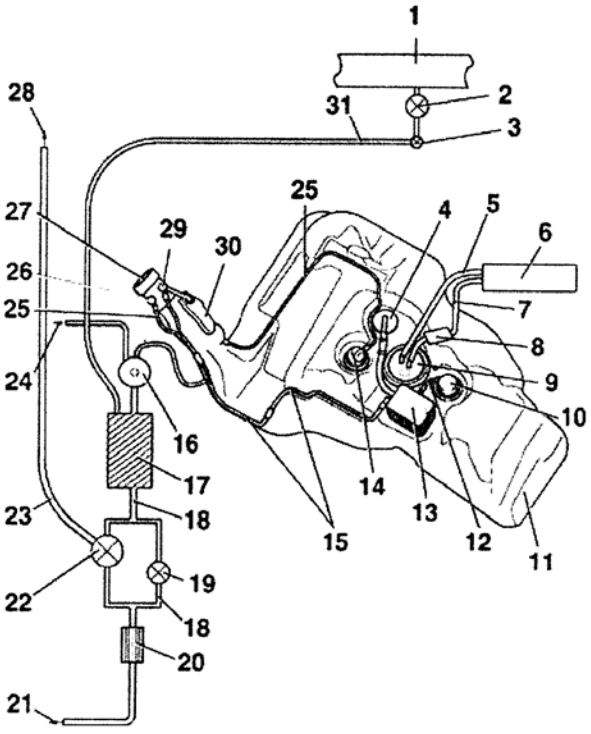

1- **Intake Manifold**
2- **Evaporative Emission (EVAP) Canister Purge** Regulator Valve (N80)
- Installation Position: Arrow Points In Direction Of Flow

3- **Test Connection**
4- **Gravity Valve**
- For Filler Ventilation
- Cannot Be Removed, Only Replace Together With Fuel Tank

5- **Return Line**
6- **Fuel Rail With Fuel Injectors**
7- **Supply Line**
8- **Fuel Filter**
- Installation Position: Arrow Points In Direction Of Flow

9- **Fuel Pump**
10- **Combination Valve**
- Vacuum Protection Valve
- For Leak Diagnistic Test

11- **Fuel Tank**
12- **Leak Diagnostic Line**
13- **Expansion Tank**
- Filler Ventilation

14- **Gravity Valve**
- Operating Ventilation
- Cannot Be Removed, Only Replace Together With Fuel Tank

15- **Vent Line**
- Filler Ventilation

16- **Pressure Retention Valve**
17- **EVAP Canister**
- Location: Connected To Chassis

18- **Vent Line**
19- **Evaporative Emission (EVAP) Canister Purge Regulator Valve (N115)**
- Secured At EVAP Canister With Bracket

20- **Air Filter for Leak Detection Pump (LDP)**
21- **Intake Line**
- Clipped Into Left Side Of Chassis

22- **Leak Detection Pump (LDP) (V144)**
- Location: Behind Fuel Tank At Left Side Of Chassis

23- **Vacuum Line**
24- **Vent Line**
- Into Environment
- Clipped Into Left Side Of Chassis

25- **Vent Line**
- For Leak Diagnostic Test: Sealing Cap/Filler Tube

26- **Check Valve**
- For Leak Diagnostic Test: Sealing Cap/Filler Tube

27- **Cap**
28- **To Engine**
29- **2-Way Valve**
- Cannot Be Removed, Only Replace Together With Fuel Tank

30- **Expansion Tank**
31- **Flush Line**
- To Test Connection/Solenoid Valve 1 In Engine Compartment

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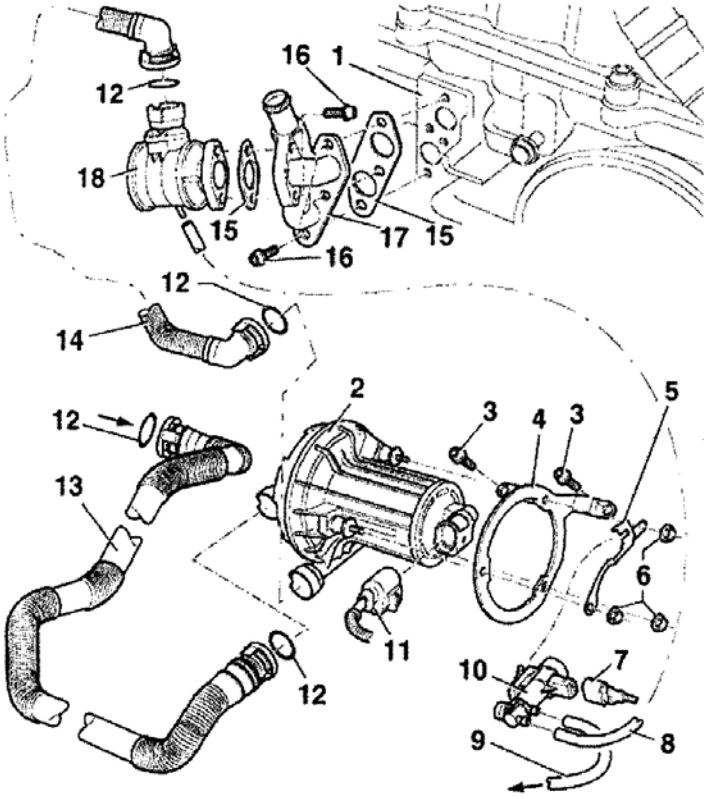
Fig. 17: Vacuum Diagram EVAP System
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Cylinder Head
2- Secondary Air Injection (AIR) Pump Motor (V101)
3- 15 ft. Lbs. (20 Nm)
4- Bracket
5- Bracket
6- 71 INCH Lbs. (8 Nm)
7- Connector
8- To Combination Valve
9- To Intake Manifold
10- Secondary Air Injection (AIR) Solenoid Valve (N112)
11- Connector
12- O-Ring
- Replace If Damaged

13- Intake Hose
- Check For Secure Fit

14- Pressure Hose
- Check For Secure Fit

15- Gasket
- Always Replace

16- 71 INCH Lbs. (8 Nm)
17- Connecting Piece
18- Combination Valve

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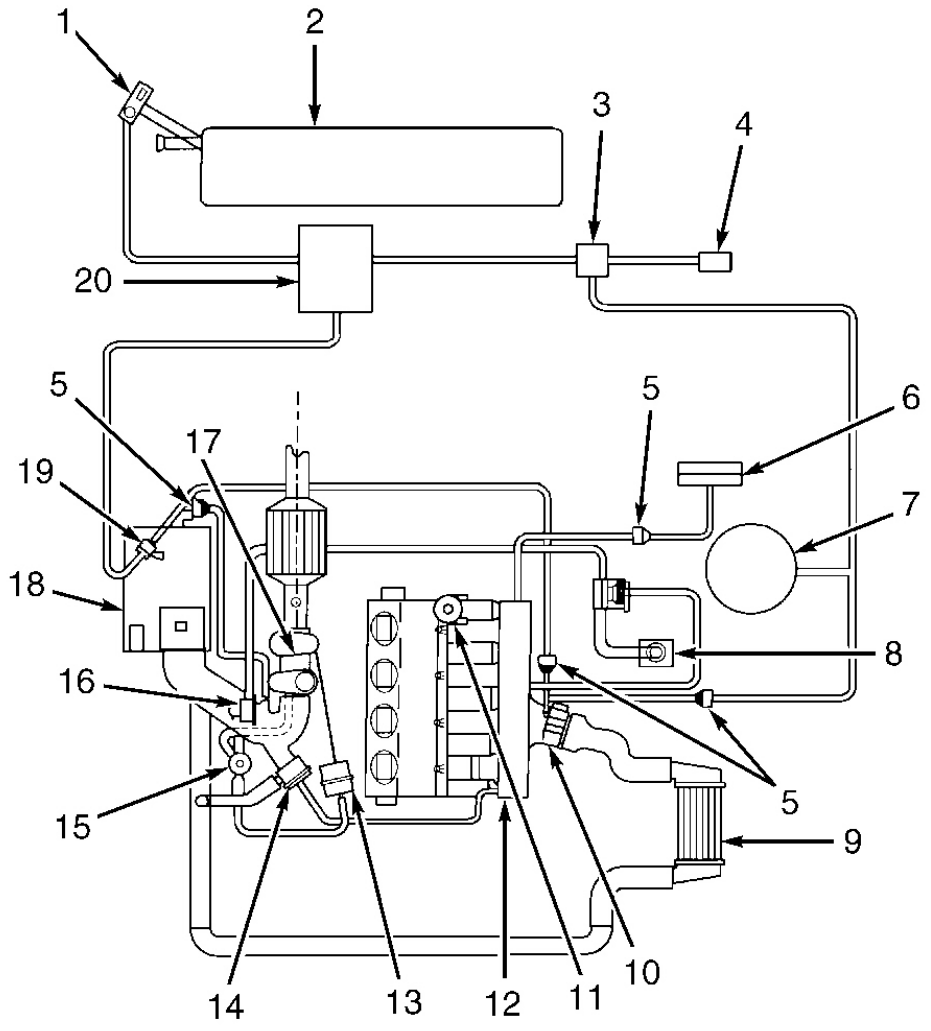
Fig. 18: Vacuum Diagram Secondary Air Injection System
Courtesy of VOLKSWAGEN UNITED STATES, INC.

PASSAT



1. Fuel Tank Filler Cap
2. Fuel Tank
3. Leak Detection Pump (LDP)
4. LDP Air Filter
5. One-Way Check Valve
6. Brake Booster
7. Vaccum Reservoir
8. PCV Valve
9. Turbocharger Intercooler
10. Throttle Valve Control Module
11. Fuel Pressure Regulator
12. Intake Manifold
13. Turbocharger Pressure Unit
14. Boost Pressure Recirculation Valve
15. Wastegate By-Pass Regulator Valve
16. PCV Valve
17. Turbocharger
18. Air Filter Housing (ACL)
19. EVAP Canister Purge Valve
20. EVAP Canister

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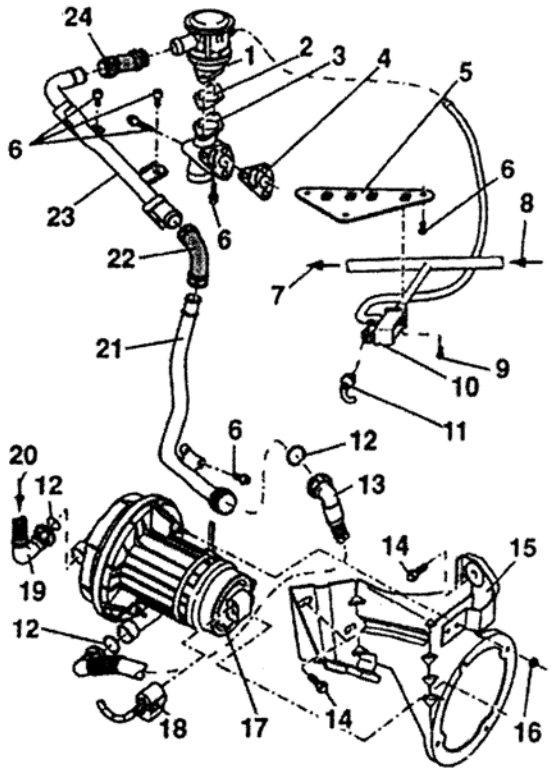
Fig. 19: Vacuum Diagram EVAP System (1.8L Turbo)

Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Combination Valve
2- Gasket
- Always Replace

3- Bracket
4- Gasket
- Always Replace

5- Bracket
6- 89 INCH Lbs. (10 Nm)
7- To Recirculating Valve For Turbocharger
8- From Vacuum Reservoir/Intake Manifold Connection
9- 6 Nm
10- Secondary Air Injection (AIR) Solenoid Valve (N112)
11- Connector
12- O-Ring
- Replace If Damaged

13- Pressure Hose
- Check For Secure Fitting
- To Disengage, Squeeze Together At Front

14- 71 INCH Lbs. (8 Nm)
15- Bracket
16- 71 INCH Lbs. (8 Nm)
17- Secondary Air Injection (AIR) Pump Motor (V101)
18- Connector
19- Intake Hose
20- From Air Filter
21- Connection Tube
22- Elbow
- Secure With Screw-Type Clamps Or Spring Clamps

23- Pressure Line
24- Connecting Piece
- Secure With Screw-Type Clamps Or Spring Clamps

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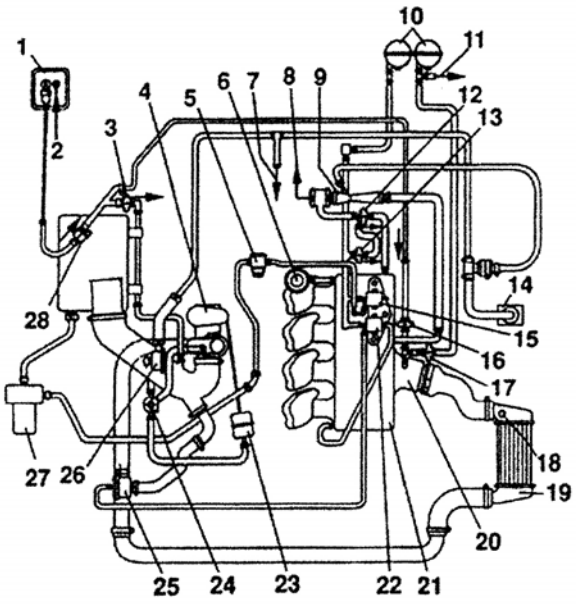
Fig. 20: Vacuum Diagram Secondary Air Injection System (1.8L Turbo)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- EVAP Canister
2- Vent Line
3- Check-Valve
- For EVAP Canister System

4- Turbocharger
5- Combination Valve
- For Secondary Air Injection (AIR) System

6- Fuel Pressure Regulator
7- To Cylinder Head Cover
- Crankcase Breather Valve

8- To Brake Booster
9- Vacuum Booster
10- Vacuum Reservoir
11- To Diagnostic Pump
12- Check Valve
- Bypass To Vacuum Booster

13- Check Valve
- For Engine Vacuum Control

14- Crankcase Ventilation
15- Secondary Air Injection (AIR) Solenoid Valve (N112)
16- Check Valve
- For EVAP System

17- Check Valve
- For Diagnostic Pump

18- Charge Air Pressure Sensor (G31)
19- Charge Air Pressure Cooler
20- Throttle Valve Control Module
21- Intake Manifold
22- Recirculating Valve For Turbocharger (N249)
23- Pressure Unit
- For Charge Air Pressure Regulation Valve (Wastegate)

24- Wastegate Bypass Regulator Valve (N75)
25- Declaration Shut-Off Valve (N75)
26- Pressure Regulation Valve
- For Crankcase Ventilation

27- Secondary Air Injection (AIR) Pump Motor (V101)
28- Evaporative Emission (EVAP) Canister Purge Regulator Valve (N80)

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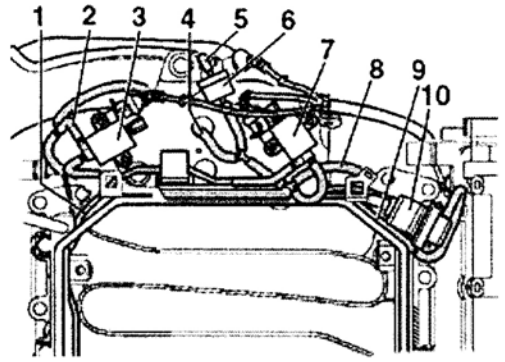
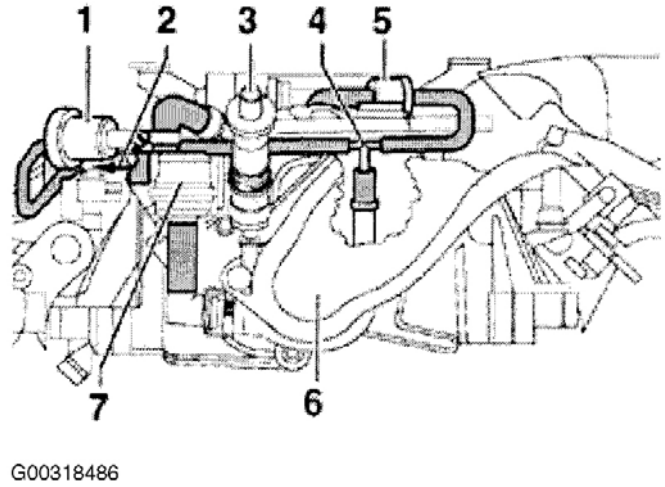
Fig. 21: Vacuum Diagram Turbo System (1.8L Turbo)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



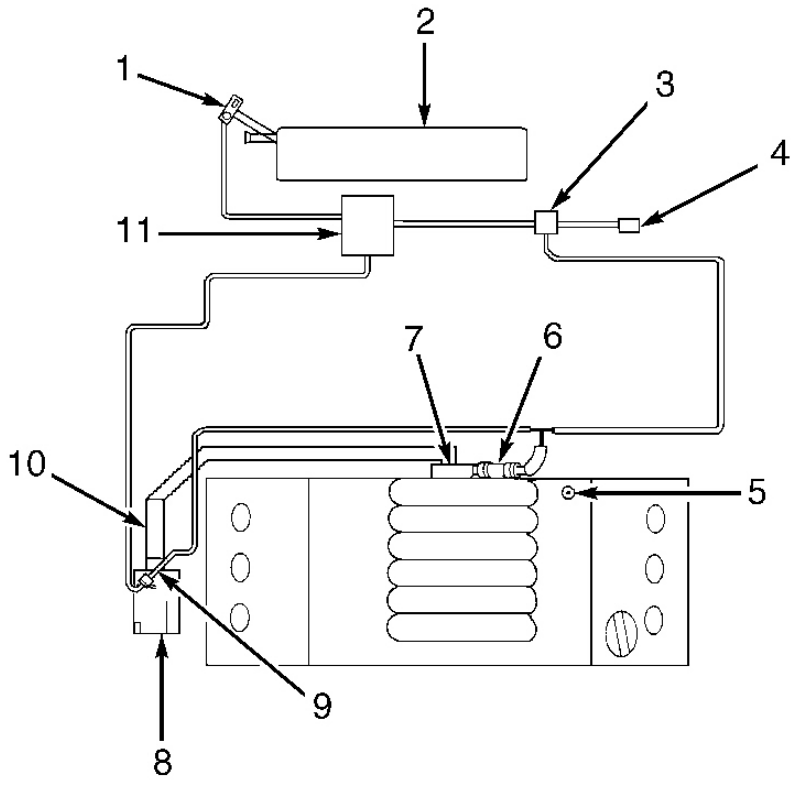
1- To Intake Manifold Tuning (Change-Over) Vacuum Solenoid
2- To Combination Valves
3- Secondary Air Injection (AIR) Solenoid Valve (N112)
4- To Secondary AIR Injection (AIR) Valve
5- To T-Piece On Intake Manifold
6- One-Way Valve
7- Intake Manifold Tuning (IMT) (N156) (Change-Over Valve)
8- To Vacuum Reservoir In Left Wheel Housing
9- To T-Piece On Intake Manifold
10- Fuel Pressure Regulator

Fig. 22: Vacuum Diagram Connections, Upper View (2.8L V6)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Fuel Pressure Regulator
2- To PCV System
3- Vacuum Amplifier
4- T-Piece
5- One-Way Valve
6- Intake Air Elbow
7- PCV Valve

Fig. 23: Vacuum Diagram Connections, Rear View (2.8L V6)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1. Fuel Tank Filler Cap
2. Fuel Tank
3. Leak Detection Pump (LDP)
4. LDP Air Filter
5. Fuel Pressure Regulator
6. Vacuum Booster
7. Throttle Valve Control Module
8. Air Cleaner Housing (ACL)
9. EVAP Canister Purge Valve
10. MAF Sensor
11. EVAP Canister

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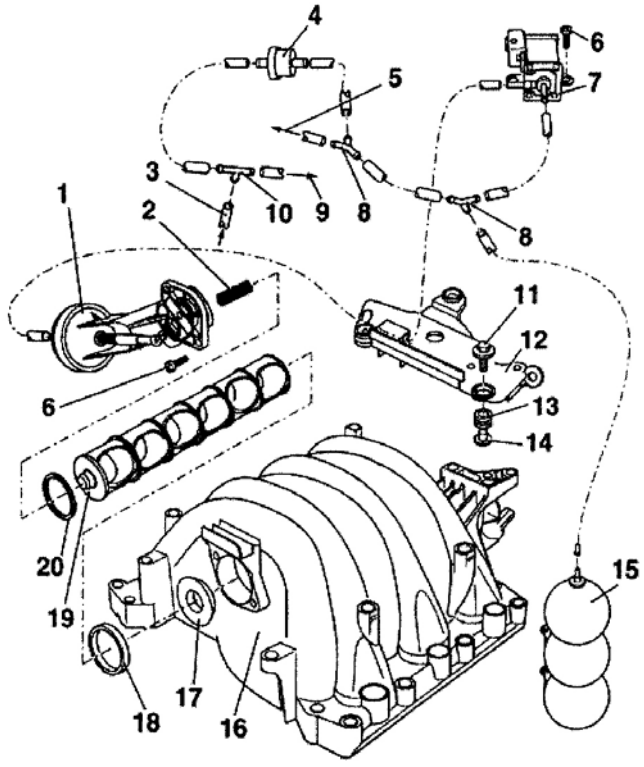
Fig. 24: Vacuum Diagram EVAP System (2.8L V6)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Vacuum Setting Element
2- Compression Spring
3- Vacuum Hose
4- Check Valve
- Installed position: Blue Side Toward Y Piece

5- To Secondary Air Injection (AIR) Solenoid Valve (N112)
6- 53 INCH Lbs
7- Intake Manifold Change-Over Valve (N156)
- Resistance: 25 to 35 ohms

8- Y-Piece
9- To Fuel Pressure Regulator
10- T-Piece
11- 89 INCH Lbs.
12- Securing Plate
13- Rubber Grommet
14- Spacer Sleeve
15- Vacuum Reservoir
- In Left Front Wheel Well

16- Intake Manifold
17- Washer
- Conical Side Toward Intake Manifold

18- Seal
- Replace If Damaged

19- Rotary Change-Over Valve
20- Seal

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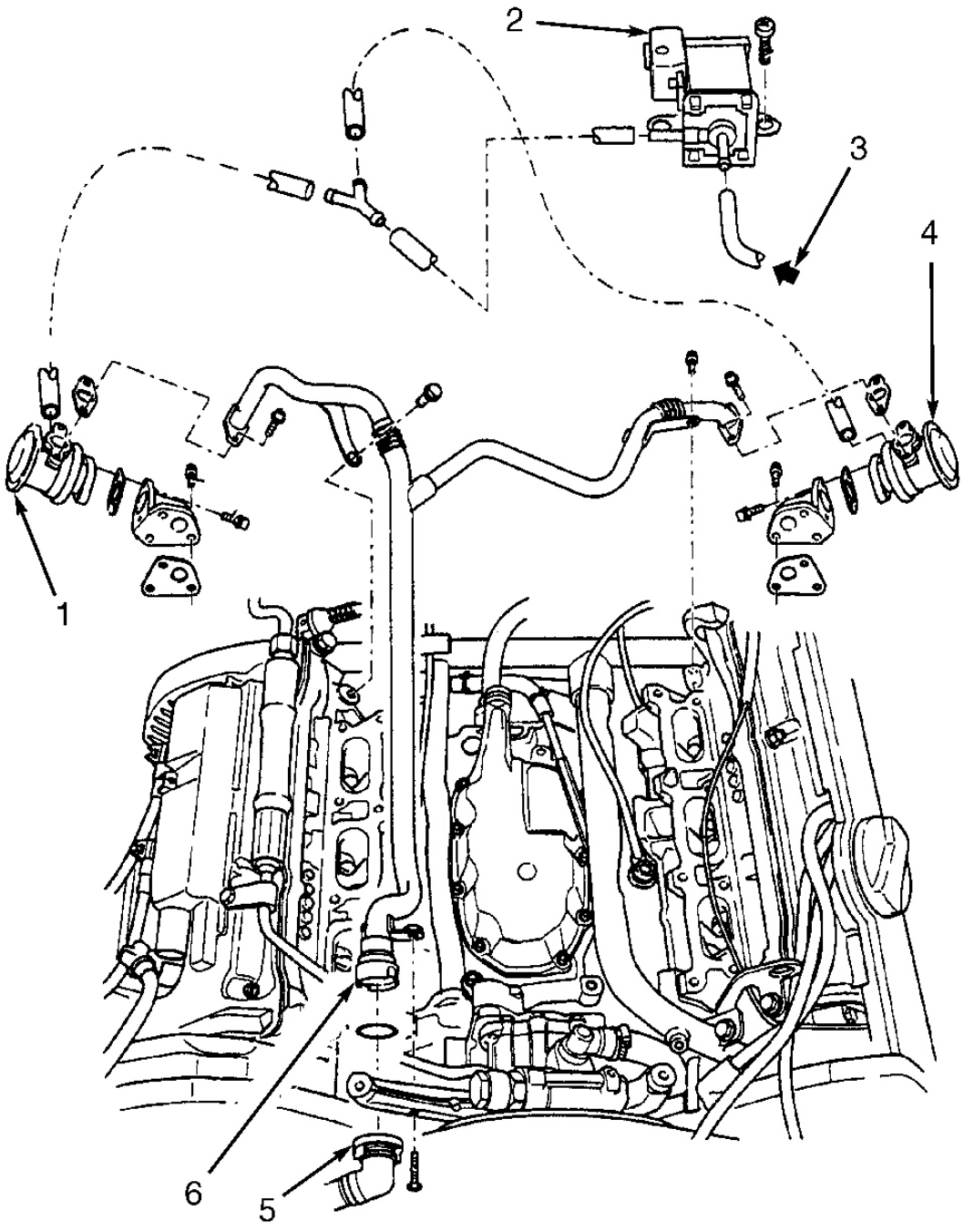
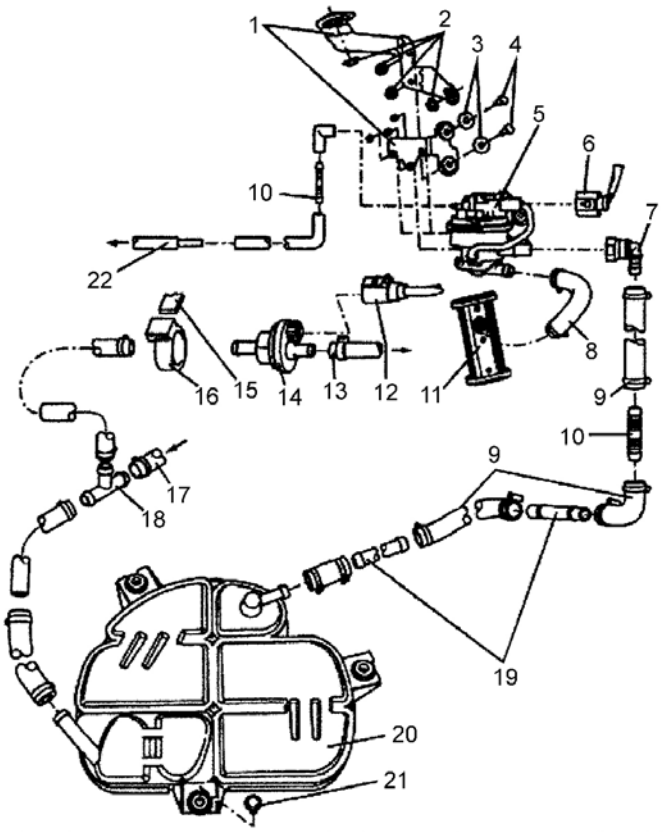
Fig. 25: Vacuum Diagram Intake Manifold Change-Over System (2.8L V6)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1. Right Combination Valve
2. Secondary Air Injection Solenoid Valve
3. To Vacuum Reservoir
4. Left Combination Valve
5. Pressure Hose
6. Connecting Pipe

Fig. 26: Vacuum Diagram Secondary Air Injection System (2.8L V6)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1. Bracket
2. 77 INCH Lbs. (8 Nm)
3. Disc
4. Bolt
5. Leak Detection Pump (LDP) (V144)
   - Under Wheelhousing Liner In Left Rear Wheelhousing
6. Connector
7. Connection Piece
   - Press Together At Front To Release
8. Connecting Hose
   - Suction Side
9. Connecting Hose
   - Pressure Side
   - Secure With Spring-Type Clips
10. Connecting Piece
11. Air Filter For Leak Detection Pump
12. Connector
13. Vacuum Line
    - Secure With Spring-Type Clips
14. Evaporative Emission (EVAP) Canister Purge Regulator Valve (N80)
    - Installed Location: Arrow Points In Direction Of Flow
15. Bracket
16. Retaining Ring
17. Vent Line
    - Ensure If Tightly Seated
    - Secure With Spring-Type Clips
18. Junction Piece
19. Connecting Pipe
20. EVAP Canister
    - In Spare Wheel Well On Vehicle Floor
21. 11 Ft. Lbs. (15 Nm)
22. Vacuum Line
    - Ensure If Tightly Seated
    - To Intake Manifold Upper Section

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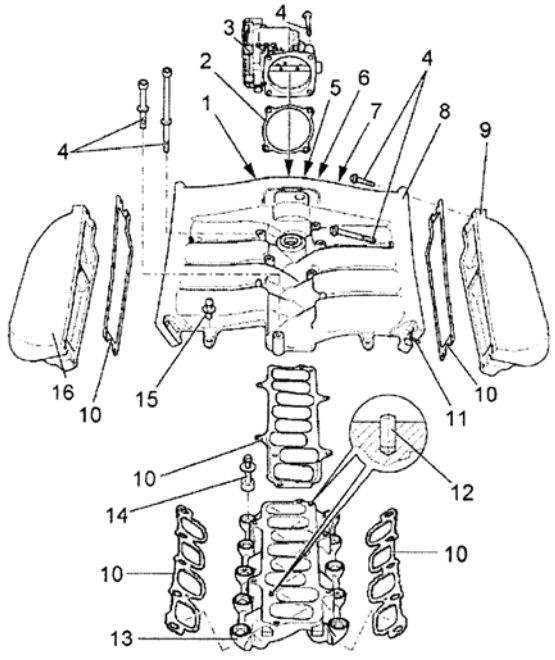
Fig. 27: Vacuum Diagram EVAP System (4.0L W8)

Courtesy of VOLKSWAGEN UNITED STATES, INC.



1- Vacuum Connection
- Below Throttle Valve Control Module
- To Evaporative Emission (EVAP) Canister Purge Regulator Valve (N80)

2- Seal
- Replace If Damaged

3- Throttle Valve Control Module (J338)
4- 71 INCH Lbs. (8Nm)
5- Vacuum Connection
- To Leak Detection Pump (LDP) (V144)

6- Vacuum Connection
- To Fuel Pressure Regulator

7- Vacuum Connection
- To Brake Booster

8- Upper Intake Manifold
- When Removing, Ensure That Alignment Pins (Items 12 & 13) Do Not Fall Into The Intake Channels!
- When Installing Upper Manifold, First Install Alignment Pins In Lower Part Of Intake Manifold

9- Intake Manifold Side-Piece
- Cylinder Bank 2 (Left Bank)

10- Seal
- Replace If Damaged

11- Vacuum Connection
- For Secondary Air Injection (AIR) Solenoid Valve (N112) And Left Electro-Hydraulic Engine Mount Solenoid Valve (N144)

12- Alignment Pins
13- Lower Part Of Intake Manifold
- With Alignment Pins

14- 80 INCH Lbs (9Nm)
15- Ball Pin, 27 INCH Lbs (3Nm)
16- Intake Manifold Side-Piece
- Cylinder Bank 1 (Right Bank)

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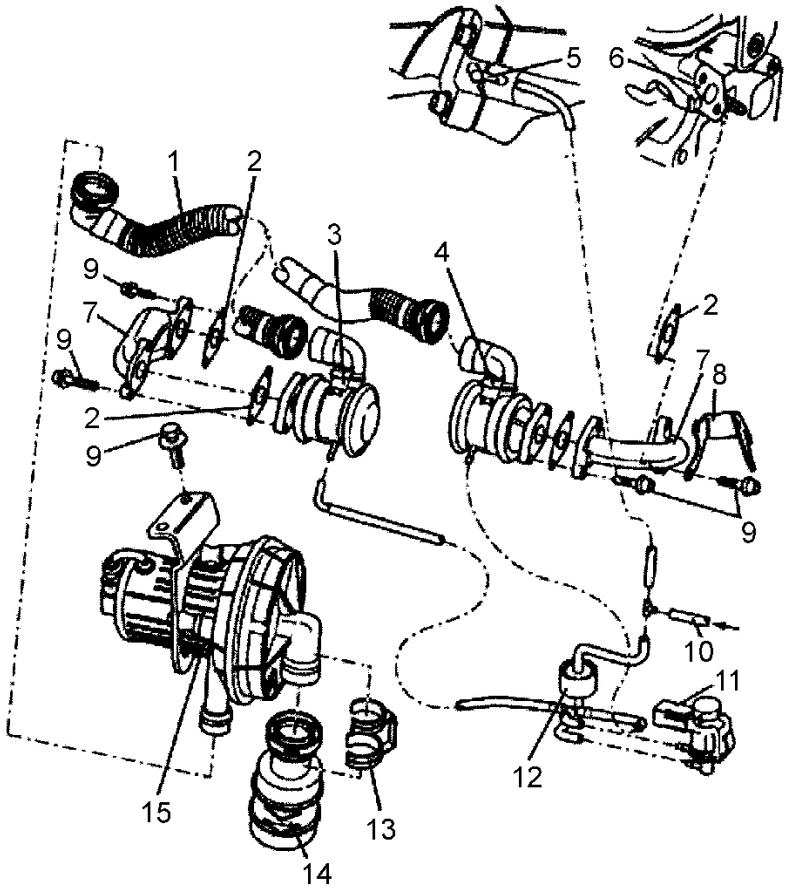
Fig. 28: Vacuum Diagram Intake Manifold, Upper Section (4.0L W8)
Courtesy of VOLKSWAGEN UNITED STATES, INC.



1. Pressure Hose
   - Ensure Hose Is Tightly Seated
   - Press Together At Front To Release
2. Gasket
   - Replace
3. Combination Valve
   - To Bank 1
4. Combination Valve
   - To Bank 2
5. Vacuum Connection
   - Left On Intake Pipe
6. Flange
   - On Cylinder Head
7. Connecting Piece
8. Bracket
   - For Oil Separator
9. 89 INCH Lbs. (10 Nm)
10. Vacuum Hose
    - From Left Electro-Hydraulic Engine Mount Solenoid Valve (N144)
11. Secondary Air Injection (AIR) Solenoid Valve (N112)
12. Non-Return Valve
    - Note Installed Position
13. Securing Clip
14. Air Filter Housing
15. Secondary Air Injection (AIR) Pump Motor (V101)

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Fig. 29: Vacuum Diagrams Secondary Air Injection System (4.0L W8)
Courtesy of VOLKSWAGEN UNITED STATES, INC.